WHAT IS CLAIMED IS:

1   1.   A method for establishing different parameters of a surface of a

2   work piece during machining of the surface using a machine with a spindle

3   supporting a tool, with the spindle rotatably supported in at least one bearing

4   in a housing, and with displacement sensor means arranged for measuring

5   displacement to which the spindle is subjected during machining operation,

6   the method comprising:

7   machining two first work pieces with different back off times to create

8   two sets of sensor signals with different level at back off times;

9   storing in an evaluation unit the sensor signals which represent

10   displacement to which the spindle was subjected during the machining of

11   the two first work pieces;

12   measuring the two machined first work pieces to obtain

13   measurement results which are loaded in the evaluation unit;

14   comparing in the evaluation unit the stored sensor signals

15   representing the displacement to which the spindle was subjected during the

16   machining of the two first work pieces with the measurement results of the

17   two machined first work pieces, and calculating transfer constants

18   representing an influence of total deflection of machine stiffness on the

19   sensor signals;

20   recording a difference in feeding positions between the two first work

21   pieces, whereby displacement sensor signals obtained at machining of

22   subsequent work pieces are fed into the evaluation unit and are processed

23   with the transfer constants to give a series of sensor signals representing a

24   true total deflection of a loaded and running machine stiffness chain; and

25   subsequently using the sensor signals representing the true total

26   deflection to calculate different parameters of the subsequently machined

27   work pieces.

1   2.   A method as claimed in Claim 1, further comprising calculating a

2   machined bore diameter from the recorded feeding positions and the true

3   total deflection signals, with the two machined first work pieces as a

4   reference.

1   3.   A method as claimed in Claim 2, measuring or calculating a

2   rotation angle of the two first work pieces, and producing a real time diagram

3   of a roundness of the first work pieces simultaneously subjected to

4   machining, by plotting the true total deflection against the rotation angle of

5   the first work pieces.

1   4.   A method as claimed in Claim 3, wherein the rotational angle of

2   the first work pieces is calculated or measured by an angular position

3   detector.

1   5.   A method as claimed in Claim 1, further comprising calculating a

2   rotational angle of a workhead spindle by signal processing to establish a

3   period in which the sensor signal repeats itself.

1   6.   A method as claimed in Claim 1, further comprising feeding the

2   tool axially and measuring a bore diameter of the first work pieces in two

3   positions axially spaced apart from each other to determine a taper of the

4   machined surface.

1   7.   A method as claimed in Claim 1, wherein the surface being

2   machined is a bore having a length that is the same as the length of the

3   grinding wheel, and further comprising calculating a taper of the bore directly

4   from the transfer constant for a deflection angle to the sensor signal.

1   8.   A method for establishing different parameters of a surface of a

2   work piece during machining of the surface using a machine with a spindle

3   supporting a tool, with the spindle rotatably supported in at least one bearing

4   in a housing, and with displacement sensor means arranged in the housing

5   for measuring displacement to which the spindle is subjected during

6   machining operation, the method comprising:

7   machining a first work piece and stopping the machining early when

8   there exists an out-of roundness;

9   measuring the first work piece;

10   storing in an evaluation unit sensor signals representing deflections

11   of the spindle obtained from a combination of a recorded signal for a last

12   revolution before back off plotted against a rotational angle of the work piece

13   and the measured work piece;

14   comparing in the evaluation unit the stored sensor signals

15   representing a displacement to which the spindle was subjected during the

16   machining of the first work piece with a result from the measurement of the

17   first work piece;

18   calculating a transfer constant representing influence of a total

19   deflection of the machine stiffness on the sensor signals;

20   recording a feeding position for the first work piece, with

21   displacement sensor signals obtained upon machining subsequent work

22   pieces being fed into the evaluation unit and being processed with the

23   transfer constant to give a series of sensor signals representing a true total

24   deflection of a loaded and running machine stiffness chain; and

25   subsequently using the true total deflection signals for calculating

26   different parameters of subsequently machined work pieces.

1   9.   A method as claimed in Claim 8, further comprising calculating a

2   machined bore diameter from the recorded feeding position and the true

3   total deflection signals, with the first machined work piece as reference.

1   10.   A method as claimed in Claim 9, further comprising measuring

2   or calculating a rotation angle of the first work piece, and producing a real

3   time diagram of a roundness of the first work piece simultaneously subjected

4   to machining, by plotting the true total deflection against the rotation angle of

5   the first work piece.

1   11.   A method as claimed in Claim 9, wherein the rotational angle of

2   the first work piece is calculated or measured by an angular position

3   detector.

1   12.   A method as claimed in Claim 8, further comprising calculating a

2   rotational angle of a workhead spindle by signal processing to establish a

3   period in which the sensor signal repeats itself.

1   13. A method as claimed in Claim 8, further comprising feeding the

2   tool axially and measuring a bore diameter of the first work piece in two

3   positions axially spaced apart from each other to determine a taper of the

4   machined surface.

1   14. A method as claimed in Claim 8, wherein the surface being

2   machined is a bore having a length that is the same as the length of the

3   grinding wheel, and further comprising calculating a taper of the bore directly

4   from the transfer constant for a deflection angle to the sensor signal.